

CLAIMS

1. A process for making granules containing an active ingredient comprising the steps of:

5 extruding homogeneous extrudates from an extrudable mixture comprising an active ingredient, a dissolvable polymer, and a solvent for said dissolvable polymer in an amount sufficient to form said extrudable mixture, and

drying said extrudates to a residual solvent content of less than 1 wt%.

10 2. A process according to claim 1 wherein said dissolvable polymer is a poly(alkylene oxide).

15 3. A process according to claim 2 wherein said poly(alkylene oxide) is poly(ethylene oxide).

4. A process according to claim 4 wherein said poly(alkylene oxide) has a molecular weight of less than about 50,000.

20 5. A process according to claim 5 wherein said poly(alkylene oxide) has a molecular weight within the range from about 15,000 to about 35,000.

25 6. A process according to claim 4 wherein said poly(alkylene oxide) has a crystalline melting point within the range of 63° to 67° C.

7. A process according to claim 1 wherein said dissolvable polymer is present in an amount within the range from about 0.2-3 wt%.

30 8. A process according to claim 1 wherein said dissolvable polymer is present in an amount within the range from about 0.2-0.75 wt%.

9. A process according to claim 1 wherein said mixture further includes an anticaking agent in an amount sufficient to prevent clumping of the dried extrudates.

5 10. A process according to claim 10 wherein said anticaking agent is present in an amount within the range from about 0.5-1.25 wt%.

10 11. A process according to claim 1 wherein said solvent is selected from the group consisting of water, alcohol-water azeotropes, organic solvents, alcohols, ketones, dimethylsulfoxide, mono- or dialkyl ethers of ethylene glycol and their derivatives, anisole, 1,4-dioxane, ethyl acetate, ethylenediamine, mono- and dialkyl ethers of diethylene glycol and their derivatives, or a mixture of any of these.

15 12. A process according to claim 1 wherein said solvent is selected from the group consisting of acetonitrile, ethylene dichloride, trichloroethylene, methylene dichloride, benzene, dimethylformamide, and tetrahydrofuran.

20 13. A process according to claim 1 wherein said solvent is selected from the group consisting of methanol, isopropanol, and butanol.

25 14. A process according to claim 1 wherein said solvent is selected from the group consisting of methyl ethyl ketone, toluene, xylene, acetone and methyl isobutyl ketone.

15. A process according to claim 1 wherein said solvent is selected from the group consisting of dimethylsulfoxide, alcohols liquid at 10° -100° C, and alcohol-water azeotropic mixtures.

16. A process according to claim 1 wherein said active ingredient is useful as a pharmaceutical drug, a beneficial bacteria, or an agrochemical.

17. A process according to claim 1 wherein said active ingredient is useful as an agrochemical.

18. A process for making granules containing insecticidally effective phosphoroamido(di)thioate comprising the steps:

extruding at ambient temperatures an extrudable mixture comprising phosphoroamido(di)thioate solids, a polymer soluble in a solvent, an anticaking agent, and a solvent for said polymer in an amount sufficient to form said extrudable mixture into extrudates, and

drying said extrudates to a moisture content of less than 1 wt%.

19. A process according to claim 18 wherein said phosphoroamido(di)thioate is acephate.

20. A process according to claim 18 wherein said polymer comprises a poly(alkylene oxide).

21. A process according to claim 20 wherein said poly(alkylene oxide) comprises poly(ethylene oxide).

22. A process according to claim 20 wherein said poly(alkylene oxide) has a molecular weight of less than 50,000.

23. A process according to claim 22 wherein said poly(alkylene oxide) has a molecular weight within the range from about 15,000 to about 35,000.

24. A process according to claim 18 wherein the extruded mixture is free of ammonium sulfate.

25. A process according to claim 18 wherein the extruding step is at ambient temperature without control over the extrusion temperature.

26. A process according to claim 25 wherein said mixture is exposed to a temperature rise of less than about 4° C thru the extruding step.

27. A process according to claim 18 further including:
spraying a solution containing a poly(alkylene oxide) and a solvent therefore onto phosphoroamido(di)thioate solids.

28. A process according to claim 18 wherein said anticaking agent includes silica.

29. A process according to claim 18 wherein said extrudable mixture consists of phosphoroamido(di)thioate particulates, a poly(alkylene oxide), an anticaking agent, and said solvent.

30. A process according to claim 18 wherein the extrusion mixture is substantially homogeneous and consists essentially of 0.2-0.75 wt% of a poly(alkylene oxide) lubricant, 0.01-1.5 wt% silica powder, 2-4 wt% water, and phosphoroamido(di)thioate particulates.

31. A process according to claim 18 wherein the extruding step is at a temperature within the range of 15° to 22° C.

32. An insecticidally active solid composition comprising:
phosphoroamido(di)thioate solids,
a polymeric lubricant that is soluble in a solvent, and
a solvent for said polymeric lubricant in an amount of less than 5 wt%.

5

33. A composition according to claim 32 wherein said
phosphoroamido(di)thioate solids comprise acephate.

34. A composition according to claim 32 wherein said polymeric lubricant
comprises a poly(alkylene oxide).

10

35. A composition according to claim 32 wherein said polymeric lubricant
comprises poly(ethylene oxide) or poly(butylene oxide).

36. A composition according to claim 32 wherein said solvent is selected from
the group consisting of water, alcohol-water azeotropes, organic solvents,
alcohols, ketones, dimethylsulfoxide, mono- or dialkyl ethers of ethylene glycol
and their derivatives, anisole, 1,4-dioxane, ethyl acetate, ethylenediamine,
mono- and dialkyl ethers of diethylene glycol and their derivatives, or a mixture
of any of these.

15

20

37. A composition according to claim 32 wherein said solvent is selected from
the group consisting of acetonitrile, ethylene dichloride, trichloroethylene,
methylene dichloride, benzene, dimethylformamide, and tetrahydrofuran.

25

38. A composition according to claim 32 wherein said solvent is selected from
the group consisting of methanol, isopropanol, and butanol.

39. A composition according to claim 32 wherein said solvent is selected from the group consisting of methyl ethyl ketone, toluene, xylene, acetone and methyl isobutyl ketone.

5 40. A composition according to claim 32 wherein said solvent is selected from the group consisting of dimethylsulfoxide, alcohols liquid at 10° -100° C, and alcohol-water azeotropic mixtures.

10 41. A composition according to claim 32 in the form of a dried granule comprising:

0.1-1 wt% poly(alkylene oxide),

0.01-1.5 wt% silica anticaking agent,

acephate and

less than 5wt% solvent for said poly(alkylene oxide).

15